	Universitas Negeri Surabaya Faculty of Mathematics and Natural Sciences Biology Undergraduate Study Program	Document Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
Laboratory Engineering	4620102187		T=2	P=0	ECTS=3.18	1	July 17, 2024

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
	.....	.....	Dr. H. Sunu Kuntjoro, S.Si., M.Si.

Learning model	**Project Based Learning**

Program Learning Outcomes (PLO)

PLO study program which is charged to the course

PLO-7	Able to work independently and collaboratively, as well as responsibly, in completing various tasks in class, in the laboratory and in the field.
PLO-9	Able to work independently in the laboratory and develop relevant skills by applying bioethics and work safety

Program Objectives (PO)

PLO-PO Matrix

P.O	PLO-7	PLO-9

PO Matrix at the end of each learning stage (Sub-PO)

P.O	Week															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Short Course Description	Laboratory techniques explore the meaning, types and functions of laboratories in schools, universities and institutions; laboratory management, various ways of storing and caring for laboratory tools and materials, practicing using various observation, measurement and analysis tools, work safety, and creating Standard Operating Procedures. Study of laboratory techniques is accompanied by various process skills (minds on activity and hands on activity) which will be used to solve problems in the field of laboratory management and its applications. Learning is delivered through presentations, discussions and assignments.

References

Main :

1. Budipramana, L.S. dan J.D. Budiono. 1993. Teknik Laboratorium. Surabaya
2. Haven, Mary C., Gregory A.Tetrault, Jerald R.Schenken.1995.Laboratory instrumentation. New York: John Wiley&Sons Inc.
3. Indrawan, Irjus. 2015. Pengantar Manajemen Sarana dan Prasarana Sekolah. Yogyakarta:Deepublish
4. Singer, Donald C. 2001. A laboratory quality handbook of best practices. United states of America:ASQ Quality Press

Supporters:

Supporting lecturer	Prof. Dr. Mahanani Tri Asri, M.Si. Prof. Dr. Yuliani, M.Si. Dr. H. Sunu Kuntjoro, S.Si., M.Si. Lisa Lisdiana, S.Si., M.Si., Ph.D. Sisca Desi Prastyaningtias, S.Si., M.Si. Nur Anindya Syamsudi, STr.Keb.,M.Kes

Week-	Final abilities of each learning stage (Sub-PO)	Evaluation		Help Learning, Learning methods, Student Assignments, [Estimated time]		Learning materials [References]	Assessment Weight (%)
		Indicator	Criteria & Form	Offline (*offline*)	Online (*online*)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

1	Understand the meaning, role, types and benefits of laboratories in schools, universities and agencies	1. Explain the meaning, function and types of laboratories. 2. Demonstrate an honest and independent attitude during the learning process based on the observation sheet	**Criteria:** Essay and multiple choice questions are assessed jointly on USS and US **Form of Assessment** : Participatory Activities	Presentation and discussion. 3 X 50			2%
2	Comparing school and college laboratories along with their human resource elements and regulations	1. Comparing school and college laboratories and their human resource elements 2. Skilled in making laboratory rules	**Criteria:** Essay and multiple choice questions are assessed jointly on USS and US **Form of Assessment** : Project Results Assessment / Product Assessment	Presentation and discussion. 3 X 50			3%
3	Planning the construction of the lab. Along with facilities and infrastructure	1. Identifying needs in planning laboratory construction 2. Planning the proposed lab construction. along with facilities and infrastructure 3. Skilled in observing laboratories in various agencies	**Criteria:** 1. Student activities and responses during learning activities, especially practicums, are assessed as participation, weight 20, 2. Essay and multiple choice questions are assessed jointly on USS and US **Form of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Presentations, discussions. and assignment 3 X 50			5%
4	Understand the management of equipment and materials in the lab.	Describe the management of equipment and materials in the lab.	**Criteria:** Essay and multiple choice questions are assessed jointly on USS and US	Presentation and discussion. 3 X 50			0%
5	Understand administration and examples of borrowing materials and equipment in the laboratory	1. Describe administration in the laboratory 2. Make examples of borrowing materials and lab equipment for administration	**Criteria:** 1. USS/UTS weight 20, Practical reports and products are assessed as ASSIGNMENTS with a weight of 30, Student activities and responses during learning activities, especially practicums, are assessed as participation, weight 20, 2. US weight 30	Presentation and discussion. 3 X 50			0%
6	Understand occupational health and safety in the lab.	Describe occupational health and safety in the laboratory.	**Criteria:** Essay and multiple choice questions are assessed jointly on USS and US	Presentation and discussion. 3 X 50			0%

7	Understand waste handling in school laboratories and properties	1. Explain the various types of waste 2. Explain how waste is handled 3. Providing suggestions for handling waste in school laboratories and properties	**Criteria:** Essay and multiple choice questions are assessed jointly on USS and US **Form of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Presentation and discussion. 3 X 50			5%
8	Sub Summative Exam /UTS		**Form of Assessment** : Test	2 X 50			10%
9	Describe SOPs, work steps and work instructions in the lab.	1. Explain the SOP 2. Describe work steps and work instructions in the lab.	**Criteria:** Essay and multiple choice questions are assessed jointly on USS and US	Presentation and discussion. 3 X 50			0%
10	Develop work procedures and practice how basic lab equipment works	1. Develop work procedures 2. Practicing how lab equipment works. Basic biology	**Criteria:** Essay and multiple choice questions are assessed jointly on USS and US **Form of Assessment** : Project Results Assessment / Product Assessment	Observation, Presentation and discussion. 3 X 50			10%
11	Practicing how microbiology lab equipment works	Practicing how lab equipment works. Microbiology, and compiling work procedures	**Criteria:** USS/UTS 20 weight **Form of Assessment** : Participatory Activities	Observation, Presentation and discussion. 3 X 50			10%
12	Practice how ecological lab equipment works and develop work procedures	Practice how ecological lab equipment works and develop work procedures	**Criteria:** Essay and multiple choice questions are assessed jointly on USS and US **Form of Assessment** : Project Results Assessment / Product Assessment	Observation Presentation and discussion. 3 X 50			10%
13	Practicing how physiology and analysis lab equipment works and preparing work procedures	Practice how physiology and analysis lab equipment works and develop work procedures	**Criteria:** Student activities and responses during learning activities, especially practicums, are assessed as participation, with a weight of 20, US with a weight of 30. Essay and multiple choice questions are assessed jointly on USS and US. Reports and practicum products are assessed as ASSIGNMENTS with a weight of 30. **Form of Assessment** : Project Results Assessment / Product Assessment	Observation, Presentation and discussion. 3 X 50			10%
14	Communicating the results of observations regarding the lab in the agency (project assignment)	Communicate the results of observations regarding the laboratory in the agency	**Criteria:** 1. Essay and multiple choice questions are assessed jointly on USS and US 2. Performance questions are integrated during learning **Form of Assessment** : Project Results Assessment / Product Assessment	Observation, Presentation and discussion. 3 X 50			10%

15	Communicating the results of observations regarding the lab in the agency (project assignment)	Communicate the results of laboratory observations at the agency	**Criteria:** Essay and multiple choice questions are assessed jointly on USS and US **Form of Assessment** : Project Results Assessment / Product Assessment	Presentation and discussion. 3 X 50			10%
16			**Form of Assessment** : Test				15%

Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
1.	Participatory Activities	17%
2.	Project Results Assessment / Product Assessment	58%
3.	Test	25%
		100%

Notes

1. **Learning Outcomes of Study Program Graduates (PLO - Study Program)** are the abilities possessed by each Study Program graduate which are the internalization of attitudes, mastery of knowledge and skills according to the level of their study program obtained through the learning process.
2. **The PLO imposed on courses** are several learning outcomes of study program graduates (CPL-Study Program) which are used for the formation/development of a course consisting of aspects of attitude, general skills, special skills and knowledge.
3. **Program Objectives (PO)** are abilities that are specifically described from the PLO assigned to a course, and are specific to the study material or learning materials for that course.
4. **Subject Sub-PO (Sub-PO)** is a capability that is specifically described from the PO that can be measured or observed and is the final ability that is planned at each learning stage, and is specific to the learning material of the course.
5. **Indicators for assessing** ability in the process and student learning outcomes are specific and measurable statements that identify the ability or performance of student learning outcomes accompanied by evidence.
6. **Assessment Criteria** are benchmarks used as a measure or measure of learning achievement in assessments based on predetermined indicators. Assessment criteria are guidelines for assessors so that assessments are consistent and unbiased. Criteria can be quantitative or qualitative.
7. **Forms of assessment:** test and non-test.
8. **Forms of learning:** Lecture, Response, Tutorial, Seminar or equivalent, Practicum, Studio Practice, Workshop Practice, Field Practice, Research, Community Service and/or other equivalent forms of learning.
9. **Learning Methods:** Small Group Discussion, Role-Play & Simulation, Discovery Learning, Self-Directed Learning, Cooperative Learning, Collaborative Learning, Contextual Learning, Project Based Learning, and other equivalent methods.
10. **Learning materials** are details or descriptions of study materials which can be presented in the form of several main points and sub-topics.
11. **The assessment weight** is the percentage of assessment of each sub-PO achievement whose size is proportional to the level of difficulty of achieving that sub-PO, and the total is 100%.
12. TM=Face to face, PT=Structured assignments, BM=Independent study.